Table S1. The imputation performances for quantitative variables 1, 3, 5, 7, and 8 under the condition $\rho = 0$, missing rate 10%, $N = 500$, and 3 missing mechanisms (MCAR, MAR, and MNAR). The mean and standard deviation (in parentheses), taken over 100 replicates, of $RMSE_p$ under Methods M_1 to M_9 are listed for each of the variables. Imputation methods: M_1: *rpart* with surrogate variables; M_2: GI (RSS) + majority rule; M_3: GI (RSS) + RE algorithm; M_4: GI (RSS) + H-RE algorithm; M_5: CHI + majority rule; M_6: CHI + RE algorithm; M_7: CHI + H-RE algorithm; M_8: iterative imputation; M_9: *mice* with cart option.

ρ	Types	Variables	Imputation Methods								
			M_1	M_2	M_3	M_4	M_5	M_6	M_7	M_8	M_9
0	MCAR	1	1.037	1.067	1.066	1.065	1.031	1.037	1.034	1.05	1.132
			(.104)	(.109)	(.113)	(.111)	(.109)	(.111)	(.105)	(.103)	(.121)
		3	1.052	1.09	1.081	1.091	1.049	1.047	1.051	1.062	1.147
			(.117)	(.122)	(.120)	(.120)	(.117)	(.114)	(.111)	(.120)	(.141)
		5	1.058	1.088	1.077	1.083	1.045	1.045	1.047	1.065	1.141
			(.104)	(.100)	(.109)	(.106)	(.104)	(.113)	(.112)	(.105)	(.121)
		7	1.049	1.079	1.076	1.074	1.043	1.039	1.041	1.067	1.142
			(.116)	(.117)	(.129)	(.124)	(.119)	(.119)	(.118)	(.117)	(.119)
		8	1.032	1.062	1.058	1.06	1.025	1.025	1.028	1.047	1.126
			(.101)	(.112)	(.103)	(.109)	(.100)	(.103)	(.102)	(.103)	(.114)
	MAR	1	1.044	1.086	1.088	1.093	1.043	1.045	1.048	1.076	1.144
			(.109)	(.115)	(.124)	(.132)	(.101)	(.104)	(.107)	(.115)	(.118)
		3	1.05	1.087	1.092	1.096	1.042	1.043	1.041	1.074	1.15
			(.093)	(.107)	(.114)	(.118)	(.092)	(.093)	(.095)	(.106)	(.114)
		5	1.064	1.096	1.094	1.097	1.051	1.046	1.048	1.09	1.17
			(.122)	(.130)	(.140)	(.127)	(.123)	(.126)	(.125)	(.125)	(.124)
		7	1.024	1.058	1.05	1.048	1.018	1.016	1.014	1.049	1.107
			(.112)	(.110)	(.122)	(.116)	(.112)	(.110)	(.107)	(.123)	(.124)
		8	1.049	1.081	1.07	1.071	1.037	1.032	1.034	1.068	1.145
			(.118)	(.135)	(.129)	(.134)	(.119)	(.121)	(.119)	(.133)	(.129)
	MNAR	1	1.669	1.683	1.684	1.682	1.664	1.665	1.667	1.676	1.715
			(.105)	(.097)	(.105)	(.105)	(.101)	(.102)	(.101)	(.100)	(.106)
		3	1.654	1.679	1.674	1.674	1.657	1.659	1.657	1.664	1.709
			(.103)	(.109)	(.106)	(.115)	(.102)	(.098)	(.101)	(.110)	(.111)
		5	1.673	1.691	1.686	1.69	1.665	1.668	1.663	1.669	1.714
			(.093)	(.107)	(.109)	(.106)	(.092)	(.084)	(.092)	(.094)	(.117)
		7	1.648	1.662	1.661	1.662	1.65	1.65	1.647	1.65	1.695
			(.097)	(.093)	(.096)	(.102)	(.085)	(.093)	(.090)	(.098)	(.122)
		8	1.652	1.667	1.657	1.653	1.647	1.645	1.649	1.653	1.707
			(.088)	(.104)	(.096)	(.094)	(.091)	(.095)	(.093)	(.090)	(.111)

Table S2. The imputation performances for quantitative variables 1, 3, 5, 7, and 8 under the condition $\rho = 0.3$, missing rate 10%, $N = 500$, and 3 missing mechanisms (MCAR, MAR, and MNAR). The mean and standard deviation (in parentheses), taken over 100 replicates, of $RMSE_p$ under Methods M_1 to M_9 are listed for each of the variables. Imputation methods: M_1: *rpart* with surrogate variables; M_2: GI (RSS) + majority rule; M_3: GI (RSS) + RE algorithm; M_4: GI (RSS) + H-RE algorithm; M_5: CHI + majority rule; M_6: CHI + RE algorithm; M_7: CHI + H-RE algorithm; M_8: iterative imputation; M_9: *mice* with cart option.

ρ	Types	Variables	Imputation Methods								
			M_1	M_2	M_3	M_4	M_5	M_6	M_7	M_8	M_9
0.3	MCAR	1	0.878	0.875	0.895	0.89	0.885	0.889	0.889	0.856	0.773
			(.092)	(.095)	(.092)	(.095)	(.093)	(.095)	(.094)	(.093)	(.082)
		3	0.863	0.869	0.889	0.881	0.88	0.89	0.89	0.847	0.763
			(.087)	(.086)	(.087)	(.088)	(.086)	(.093)	(.085)	(.093)	(.076)
		5	0.844	0.851	0.864	0.868	0.854	0.863	0.867	0.82	0.664
			(.091)	(.094)	(.090)	(.095)	(.095)	(.096)	(.095)	(.112)	(.084)
		7	0.918	0.91	0.928	0.922	0.906	0.931	0.926	0.885	0.827
			(.103)	(.110)	(.096)	(.104)	(.105)	(.102)	(.103)	(.099)	(.094)
		8	0.893	0.895	0.902	0.905	0.904	0.915	0.908	0.865	0.868
			(.087)	(.084)	(.091)	(.086)	(.093)	(.079)	(.083)	(.080)	(.081)
	MAR	1	0.949	0.956	0.958	0.968	0.968	0.96	0.968	0.968	0.886
			(.109)	(.099)	(.108)	(.121)	(.107)	(.105)	(.117)	(.117)	(.102)
		3	0.924	0.94	0.952	0.949	0.949	0.96	0.957	0.921	0.829
			(.105)	(.106)	(.110)	(.109)	(.107)	(.107)	(.114)	(.110)	(.082)
		5	0.901	0.927	0.953	0.951	0.949	0.955	0.959	0.921	0.755
			(.101)	(.098)	(.104)	(.106)	(.106)	(.092)	(.105)	(.109)	(.078)
		7	0.99	1.008	1.012	1.007	1.019	1.017	1.008	0.987	0.906
			(.107)	(.104)	(.114)	(.112)	(.107)	(.119)	(.104)	(.118)	(.097)
		8	0.926	0.942	0.941	0.949	0.954	0.948	0.954	0.921	0.935
			(.108)	(.108)	(.109)	(.104)	(.116)	(.111)	(.123)	(.105)	(.104)
	MNAR	1	1.31	1.311	1.385	1.382	1.331	1.397	1.391	1.285	1.148
			(.105)	(.103)	(.107)	(.111)	(.109)	(.115)	(.117)	(.112)	(.099)
		3	1.269	1.283	1.295	1.289	1.303	1.302	1.299	1.239	1.089
			(.113)	(.115)	(.117)	(.117)	(.105)	(.117)	(.123)	(.113)	(.103)
		5	1.209	1.212	1.251	1.235	1.243	1.256	1.252	1.191	0.976
			(.092)	(.088)	(.100)	(.097)	(.106)	(.106)	(.098)	(.089)	(.087)
		7	1.381	1.384	1.437	1.431	1.427	1.454	1.442	1.359	1.209
			(.108)	(.111)	(.092)	(.102)	(.107)	(.111)	(.097)	(.101)	(.105)
		8	1.349	1.342	1.412	1.399	1.383	1.434	1.43	1.32	1.276
			(.109)	(.111)	(.110)	(.114)	(.115)	(.108)	(.110)	(.108)	(.113)

Table S3. The imputation performances for quantitative variables 1, 3, 5, 7, and 8 under the condition $\rho = 0.5$, missing rate 10%, $N = 500$, and 3 missing mechanisms (MCAR, MAR, and MNAR). The mean and standard deviation (in parentheses), taken over 100 replicates, of $RMSE_p$ under Methods M_1 to M_9 are listed for each of the variables. Imputation methods: M_1: *rpart* with surrogate variables; M_2: GI (RSS) + majority rule; M_3: GI (RSS) + RE algorithm; M_4: GI (RSS) + H-RE algorithm; M_5: CHI + majority rule; M_6: CHI + RE algorithm; M_7: CHI + H-RE algorithm; M_8: iterative imputation; M_9: *mice* with cart option.

ρ	Types	Variables	Imputation Methods								
			M_1	M_2	M_3	M_4	M_5	M_6	M_7	M_8	M_9
0.5	MCAR	1	0.827	0.837	0.839	0.839	0.838	0.843	0.842	0.828	0.857
			(.081)	(.082)	(.081)	(.086)	(.082)	(.080)	(.084)	(.076)	(.081)
		3	0.795	0.798	0.806	0.806	0.807	0.813	0.812	0.782	0.776
			(.072)	(.084)	(.077)	(.076)	(.081)	(.075)	(.076)	(.080)	(.084)
		5	0.777	0.781	0.792	0.783	0.786	0.787	0.787	0.766	0.802
			(.079)	(.077)	(.079)	(.081)	(.075)	(.078)	(.073)	(.075)	(.076)
		7	0.792	0.797	0.799	0.797	0.803	0.803	0.805	0.791	0.823
			(.076)	(.077)	(.074)	(.073)	(.081)	(.076)	(.078)	(.071)	(.085)
		8	0.816	0.811	0.819	0.809	0.817	0.818	0.822	0.8	0.827
			(.086)	(.090)	(.085)	(.086)	(.092)	(.080)	(.085)	(.086)	(.090)
	MAR	1	0.853	0.87	0.878	0.874	0.882	0.896	0.891	0.852	0.881
			(.088)	(.091)	(.088)	(.094)	(.094)	(.102)	(.099)	(.093)	(.091)
		3	0.805	0.814	0.831	0.824	0.813	0.825	0.817	0.797	0.793
			(.081)	(.078)	(.080)	(.084)	(.079)	(.085)	(.089)	(.086)	(.087)
		5	0.811	0.81	0.819	0.808	0.828	0.832	0.824	0.804	0.848
			(.074)	(.071)	(.072)	(.073)	(.078)	(.073)	(.078)	(.078)	(.083)
		7	0.833	0.835	0.832	0.834	0.847	0.843	0.843	0.834	0.875
			(.083)	(.087)	(.087)	(.087)	(.095)	(.093)	(.092)	(.087)	(.096)
		8	0.849	0.86	0.857	0.863	0.867	0.861	0.863	0.843	0.862
			(.076)	(.078)	(.079)	(.079)	(.082)	(.080)	(.086)	(.081)	(.086)
	MNAR	1	1.208	1.216	1.24	1.244	1.243	1.265	1.268	1.179	1.19
			(.098)	(.112)	(.110)	(.111)	(.116)	(.118)	(.120)	(.101)	(.091)
		3	1.117	1.121	1.126	1.116	1.142	1.144	1.134	1.086	1.039
			(.097)	(.091)	(.101)	(.097)	(.101)	(.099)	(.101)	(.104)	(.110)
		5	1.127	1.121	1.114	1.107	1.142	1.126	1.119	1.094	1.097
			(.102)	(.099)	(.096)	(.101)	(.107)	(.104)	(.105)	(.094)	(.098)
		7	1.14	1.133	1.118	1.121	1.16	1.151	1.15	1.121	1.135
			(.087)	(.092)	(.090)	(.093)	(.095)	(.096)	(.094)	(.087)	(.095)
		8	1.157	1.147	1.188	1.188	1.178	1.208	1.212	1.134	1.12
			(.091)	(.095)	(.103)	(.101)	(.089)	(.101)	(.102)	(.093)	(.100)

Table S4. The imputation performances for quantitative variables 1, 3, 5, 7, and 8 under the condition $\rho = 0.7$, missing rate 10%, $N = 500$, and 3 missing mechanisms (MCAR, MAR, and MNAR). The mean and standard deviation (in parentheses), taken over 100 replicates, of $RMSE_p$ under Methods M_1 to M_9 are listed for each of the variables. Imputation methods: M_1: *rpart* with surrogate variables; M_2: GI (RSS) + majority rule; M_3: GI (RSS) + RE algorithm; M_4: GI (RSS) + H-RE algorithm; M_5: CHI + majority rule; M_6: CHI + RE algorithm; M_7: CHI + H-RE algorithm; M_8: iterative imputation; M_9: *mice* with cart option.

ρ	Types	Variables	Imputation Methods								
			M_1	M_2	M_3	M_4	M_5	M_6	M_7	M_8	M_9
0.7	MCAR	1	0.674	0.676	0.68	0.679	0.683	0.681	0.68	0.662	0.695
			(.075)	(.076)	(.081)	(.077)	(.076)	(.080)	(.078)	(.071)	(.076)
		3	0.588	0.587	0.591	0.591	0.603	0.62	0.618	0.588	0.552
			(.059)	(.060)	(.065)	(.063)	(.062)	(.064)	(.067)	(.057)	(.061)
		5	0.644	0.64	0.648	0.647	0.654	0.687	0.679	0.634	0.659
			(.067)	(.068)	(.067)	(.071)	(.074)	(.077)	(.070)	(.071)	(.075)
		7	0.629	0.623	0.626	0.626	0.627	0.631	0.628	0.622	0.617
			(.058)	(.060)	(.057)	(.057)	(.063)	(.057)	(.057)	(.064)	(.067)
		8	0.624	0.618	0.619	0.619	0.626	0.627	0.627	0.62	0.635
			(.057)	(.058)	(.058)	(.058)	(.059)	(.058)	(.057)	(.058)	(.066)
	MAR	1	0.683	0.689	0.688	0.69	0.692	0.694	0.696	0.682	0.711
			(.074)	(.070)	(.073)	(.072)	(.075)	(.077)	(.078)	(.076)	(.081)
		3	0.634	0.633	0.635	0.636	0.644	0.647	0.647	0.633	0.613
			(.077)	(.075)	(.075)	(.076)	(.076)	(.081)	(.084)	(.073)	(.066)
		5	0.705	0.707	0.715	0.711	0.724	0.75	0.741	0.698	0.7
			(.071)	(.071)	(.080)	(.078)	(.080)	(.101)	(.099)	(.071)	(.070)
		7	0.68	0.67	0.673	0.672	0.68	0.681	0.68	0.675	0.654
			(.074)	(.072)	(.072)	(.073)	(.074)	(.075)	(.074)	(.078)	(.070)
		8	0.673	0.663	0.664	0.664	0.675	0.673	0.673	0.665	0.669
			(.073)	(.073)	(.074)	(.074)	(.072)	(.073)	(.073)	(.072)	(.075)
	MNAR	1	0.901	0.905	0.928	0.926	0.92	0.929	0.931	0.881	0.871
			(.085)	(.088)	(.092)	(.095)	(.096)	(.091)	(.092)	(.083)	(.085)
		3	0.771	0.755	0.765	0.767	0.789	0.805	0.802	0.764	0.672
			(.076)	(.076)	(.078)	(.081)	(.089)	(.095)	(.099)	(.083)	(.071)
		5	0.886	0.874	0.872	0.87	0.926	0.926	0.921	0.875	0.879
			(.105)	(.100)	(.105)	(.105)	(.099)	(.103)	(.100)	(.102)	(.092)
		7	0.845	0.827	0.831	0.831	0.849	0.851	0.849	0.824	0.789
			(.084)	(.083)	(.082)	(.083)	(.088)	(.084)	(.088)	(.091)	(.073)
		8	0.819	0.799	0.798	0.798	0.815	0.818	0.815	0.804	0.789
			(.082)	(.078)	(.078)	(.077)	(.079)	(.080)	(.078)	(.079)	(.076)

Table S5. The imputation performances for ordinal categorical variables 9, 11, 12, 13, and 15 under the condition $\rho = 0$, missing rate 10%, $N = 500$, and 3 missing mechanisms (MCAR, MAR, and MNAR). The mean and standard deviation (in parentheses), taken over 100 replicates, of PCC_p under Methods M_1 to M_9 are listed for each of the variables. Imputation methods: M_1: *rpart* with surrogate variables; M_2: GI (RSS) + majority rule; M_3: GI (RSS) + RE algorithm; M_4: GI (RSS) + H-RE algorithm; M_5: CHI + majority rule; M_6: CHI + RE algorithm; M_7: CHI + H-RE algorithm; M_8: iterative imputation; M_9: *mice* with cart option.

ρ	Types	Variables	Imputation Methods								
			M_1	M_2	M_3	M_4	M_5	M_6	M_7	M_8	M_9
0	MCAR	9	0.545	0.539	0.54	0.542	0.55	0.559	0.551	0.545	0.537
			(.073)	(.077)	(.080)	(.078)	(.071)	(.073)	(.067)	(.080)	(.072)
		11	0.541	0.538	0.54	0.538	0.541	0.546	0.54	0.535	0.529
			(.068)	(.071)	(.068)	(.066)	(.063)	(.064)	(.060)	(.069)	(.067)
		12	0.484	0.49	0.489	0.49	0.494	0.493	0.497	0.491	0.496
			(.061)	(.074)	(.069)	(.071)	(.069)	(.069)	(.068)	(.068)	(.075)
		13	0.493	0.501	0.493	0.493	0.502	0.502	0.5	0.498	0.497
			(.064)	(.066)	(.071)	(.069)	(.077)	(.069)	(.074)	(.069)	(.067)
		15	0.358	0.356	0.36	0.36	0.356	0.358	0.359	0.36	0.349
			(.066)	(.071)	(.070)	(.068)	(.060)	(.062)	(.070)	(.072)	(.068)
	MAR	9	0.543	0.54	0.542	0.543	0.535	0.538	0.544	0.538	0.535
			(.077)	(.075)	(.072)	(.074)	(.073)	(.077)	(.074)	(.074)	(.070)
		11	0.535	0.515	0.515	0.515	0.546	0.538	0.543	0.513	0.521
			(.081)	(.080)	(.083)	(.080)	(.079)	(.072)	(.073)	(.080)	(.076)
		12	0.504	0.507	0.508	0.507	0.499	0.5	0.506	0.507	0.507
			(.073)	(.069)	(.070)	(.071)	(.080)	(.075)	(.076)	(.066)	(.064)
		13	0.501	0.492	0.495	0.494	0.492	0.493	0.497	0.496	0.5
			(.073)	(.085)	(.083)	(.081)	(.076)	(.070)	(.078)	(.085)	(.078)
		15	0.338	0.337	0.34	0.339	0.35	0.353	0.355	0.339	0.332
			(.069)	(.077)	(.074)	(.075)	(.066)	(.073)	(.069)	(.073)	(.064)
	MNAR	9	0.635	0.591	0.596	0.596	0.611	0.623	0.615	0.591	0.567
			(.102)	(.101)	(.107)	(.106)	(.110)	(.111)	(.120)	(.113)	(.070)
		11	0.642	0.588	0.596	0.597	0.623	0.62	0.636	0.589	0.567
			(.096)	(.117)	(.112)	(.110)	(.118)	(.126)	(.118)	(.107)	(.066)
		12	0.369	0.405	0.41	0.403	0.421	0.397	0.388	0.408	0.421
			(.100)	(.107)	(.105)	(.107)	(.108)	(.107)	(.113)	(.105)	(.079)
		13	0.386	0.439	0.437	0.435	0.419	0.399	0.389	0.42	0.431
			(.095)	(.103)	(.096)	(.099)	(.129)	(.117)	(.115)	(.097)	(.069)
		15	0.321	0.324	0.324	0.319	0.347	0.36	0.374	0.33	0.342
			(.105)	(.109)	(.103)	(.105)	(.126)	(.123)	(.132)	(.103)	(.073)

Table S6. The imputation performances for ordinal categorical variables 9, 11, 12, 13, and 15 under the condition $\rho = 0.3$, missing rate 10%, $N = 500$, and 3 missing mechanisms (MCAR, MAR, and MNAR). The mean and standard deviation (in parentheses), taken over 100 replicates, of PCC_p under Methods M_1 to M_9 are listed for each of the variables. Imputation methods: M_1: *rpart* with surrogate variables; M_2: GI (RSS) + majority rule; M_3: GI (RSS) + RE algorithm; M_4: GI (RSS) + H-RE algorithm; M_5: CHI + majority rule; M_6: CHI + RE algorithm; M_7: CHI + H-RE algorithm; M_8: iterative imputation; M_9: *mice* with cart option.

ρ	Types	Variables	Imputation Methods								
			M_1	M_2	M_3	M_4	M_5	M_6	M_7	M_8	M_9
0.3	MCAR	9	0.593	0.577	0.577	0.58	0.577	0.59	0.59	0.577	0.562
			(.069)	(.069)	(.067)	(.070)	(.069)	(.074)	(.068)	(.068)	(.077)
		11	0.59	0.558	0.562	0.563	0.574	0.578	0.572	0.57	0.551
			(.069)	(.073)	(.073)	(.073)	(.067)	(.065)	(.069)	(.072)	(.072)
		12	0.564	0.557	0.555	0.556	0.549	0.552	0.553	0.553	0.537
			(.067)	(.068)	(.066)	(.066)	(.071)	(.071)	(.072)	(.065)	(.061)
		13	0.559	0.544	0.543	0.541	0.565	0.552	0.558	0.539	0.541
			(.074)	(.077)	(.078)	(.078)	(.064)	(.068)	(.071)	(.079)	(.077)
		15	0.411	0.401	0.401	0.401	0.389	0.395	0.391	0.398	0.373
			(.079)	(.079)	(.079)	(.079)	(.069)	(.067)	(.070)	(.079)	(.065)
	MAR	9	0.746	0.709	0.715	0.715	0.708	0.734	0.723	0.712	0.665
			(.065)	(.084)	(.082)	(.080)	(.082)	(.069)	(.076)	(.078)	(.082)
		11	0.745	0.709	0.711	0.711	0.722	0.727	0.723	0.713	0.672
			(.073)	(.086)	(.083)	(.081)	(.078)	(.077)	(.083)	(.080)	(.077)
		12	0.622	0.617	0.615	0.617	0.606	0.612	0.616	0.616	0.572
			(.081)	(.079)	(.081)	(.081)	(.085)	(.089)	(.087)	(.079)	(.075)
		13	0.629	0.607	0.608	0.606	0.604	0.614	0.613	0.609	0.57
			(.072)	(.085)	(.080)	(.085)	(.086)	(.086)	(.086)	(.082)	(.087)
		15	0.543	0.495	0.497	0.496	0.503	0.51	0.516	0.498	0.437
			(.077)	(.088)	(.088)	(.088)	(.096)	(.088)	(.088)	(.088)	(.077)
	MNAR	9	0.676	0.635	0.638	0.632	0.648	0.649	0.648	0.641	0.596
			(.095)	(.097)	(.106)	(.105)	(.107)	(.106)	(.104)	(.104)	(.072)
		11	0.671	0.642	0.646	0.649	0.652	0.68	0.673	0.646	0.598
			(.100)	(.106)	(.110)	(.111)	(.108)	(.111)	(.109)	(.105)	(.076)
		12	0.427	0.458	0.455	0.46	0.456	0.461	0.464	0.459	0.471
			(.107)	(.108)	(.104)	(.103)	(.117)	(.123)	(.111)	(.101)	(.077)
		13	0.451	0.48	0.482	0.483	0.473	0.473	0.479	0.48	0.464
			(.098)	(.111)	(.111)	(.110)	(.118)	(.123)	(.119)	(.107)	(.066)
		15	0.427	0.421	0.43	0.43	0.418	0.417	0.422	0.429	0.383
			(.120)	(.120)	(.119)	(.119)	(.125)	(.143)	(.137)	(.119)	(.074)

Table S7. The imputation performances for ordinal categorical variables 9, 11, 12, 13, and 15 under the condition $\rho = 0.5$, missing rate 10%, $N = 500$, and 3 missing mechanisms (MCAR, MAR, and MNAR). The mean and standard deviation (in parentheses), taken over 100 replicates, of PCC_p under Methods M_1 to M_9 are listed for each of the variables. Imputation methods: M_1: *rpart* with surrogate variables; M_2: GI (RSS) + majority rule; M_3: GI (RSS) + RE algorithm; M_4: GI (RSS) + H-RE algorithm; M_5: CHI + majority rule; M_6: CHI + RE algorithm; M_7: CHI + H-RE algorithm; M_8: iterative imputation; M_9: *mice* with cart option.

ρ	Types	Variables	Imputation Methods								
			M_1	M_2	M_3	M_4	M_5	M_6	M_7	M_8	M_9
0.5	MCAR	9	0.675	0.657	0.658	0.659	0.663	0.666	0.665	0.657	0.624
			(.068)	(.076)	(.074)	(.075)	(.066)	(.063)	(.064)	(.078)	(.062)
		11	0.689	0.673	0.673	0.673	0.672	0.67	0.67	0.67	0.635
			(.070)	(.065)	(.068)	(.067)	(.063)	(.065)	(.064)	(.072)	(.067)
		12	0.662	0.64	0.639	0.64	0.652	0.654	0.653	0.639	0.611
			(.062)	(.067)	(.066)	(.064)	(.065)	(.064)	(.065)	(.062)	(.070)
		13	0.671	0.652	0.653	0.653	0.651	0.654	0.653	0.652	0.61
			(.067)	(.066)	(.064)	(.065)	(.066)	(.066)	(.065)	(.066)	(.079)
		15	0.498	0.471	0.476	0.476	0.486	0.49	0.489	0.476	0.443
			(.065)	(.065)	(.067)	(.066)	(.069)	(.064)	(.065)	(.064)	(.065)
	MAR	9	0.873	0.855	0.856	0.855	0.865	0.871	0.871	0.854	0.808
			(.046)	(.064)	(.063)	(.064)	(.057)	(.050)	(.050)	(.064)	(.071)
		11	0.88	0.865	0.865	0.864	0.873	0.877	0.878	0.865	0.825
			(.046)	(.064)	(.064)	(.066)	(.049)	(.044)	(.044)	(.063)	(.068)
		12	0.804	0.777	0.779	0.78	0.774	0.781	0.782	0.775	0.734
			(.064)	(.064)	(.065)	(.063)	(.080)	(.082)	(.079)	(.067)	(.070)
		13	0.791	0.777	0.776	0.775	0.78	0.78	0.78	0.779	0.727
			(.065)	(.071)	(.073)	(.073)	(.073)	(.080)	(.080)	(.069)	(.071)
		15	0.698	0.678	0.678	0.678	0.667	0.676	0.675	0.68	0.613
			(.073)	(.081)	(.081)	(.081)	(.086)	(.081)	(.083)	(.079)	(.086)
	MNAR	9	0.737	0.715	0.715	0.716	0.716	0.709	0.709	0.715	0.67
			(.080)	(.086)	(.088)	(.088)	(.112)	(.111)	(.111)	(.089)	(.074)
		11	0.725	0.693	0.696	0.696	0.718	0.727	0.722	0.694	0.67
			(.081)	(.089)	(.092)	(.091)	(.092)	(.089)	(.094)	(.095)	(.069)
		12	0.583	0.572	0.574	0.576	0.588	0.577	0.575	0.569	0.561
			(.111)	(.104)	(.103)	(.103)	(.101)	(.106)	(.111)	(.104)	(.085)
		13	0.59	0.588	0.591	0.594	0.602	0.604	0.605	0.589	0.565
			(.098)	(.113)	(.108)	(.107)	(.107)	(.102)	(.101)	(.113)	(.068)
		15	0.559	0.528	0.53	0.53	0.545	0.548	0.546	0.526	0.481
			(.124)	(.106)	(.107)	(.107)	(.128)	(.132)	(.134)	(.104)	(.081)

Table S8. The imputation performances for ordinal categorical variables 9, 11, 12, 13, and 15 under the condition $\rho = 0.7$, missing rate 10%, $N = 500$, and 3 missing mechanisms (MCAR, MAR, and MNAR). The mean and standard deviation (in parentheses), taken over 100 replicates, of PCC_p under Methods M_1 to M_9 are listed for each of the variables. Imputation methods: M_1: *rpart* with surrogate variables; M_2: GI (RSS) + majority rule; M_3: GI (RSS) + RE algorithm; M_4: GI (RSS) + H-RE algorithm; M_5: CHI + majority rule; M_6: CHI + RE algorithm; M_7: CHI + H-RE algorithm; M_8: iterative imputation; M_9: *mice* with cart option.

ρ	Types	Variables	Imputation Methods								
			M_1	M_2	M_3	M_4	M_5	M_6	M_7	M_8	M_9
0.7	MCAR	9	0.799	0.786	0.787	0.786	0.79	0.793	0.792	0.785	0.762
			(.060)	(.059)	(.061)	(.062)	(.063)	(.063)	(.064)	(.060)	(.060)
		11	0.793	0.777	0.776	0.776	0.786	0.789	0.788	0.777	0.759
			(.056)	(.059)	(.060)	(.060)	(.053)	(.055)	(.055)	(.059)	(.058)
		12	0.785	0.766	0.768	0.768	0.776	0.777	0.776	0.772	0.742
			(.062)	(.063)	(.063)	(.063)	(.059)	(.061)	(.061)	(.060)	(.063)
		13	0.781	0.768	0.767	0.767	0.776	0.774	0.774	0.767	0.744
			(.064)	(.061)	(.061)	(.061)	(.061)	(.061)	(.060)	(.061)	(.058)
		15	0.631	0.611	0.612	0.612	0.62	0.621	0.622	0.613	0.589
			(.072)	(.072)	(.070)	(.070)	(.069)	(.068)	(.067)	(.070)	(.065)
	MAR	9	0.976	0.976	0.976	0.976	0.975	0.976	0.975	0.976	0.964
			(.022)	(.022)	(.022)	(.022)	(.022)	(.022)	(.022)	(.022)	(.035)
		11	0.98	0.979	0.979	0.979	0.979	0.979	0.979	0.979	0.965
			(.019)	(.022)	(.022)	(.022)	(.021)	(.021)	(.021)	(.022)	(.034)
		12	0.95	0.946	0.946	0.946	0.948	0.95	0.949	0.946	0.926
			(.028)	(.033)	(.033)	(.033)	(.030)	(.029)	(.029)	(.033)	(.047)
		13	0.947	0.942	0.942	0.942	0.942	0.944	0.943	0.942	0.921
			(.034)	(.036)	(.036)	(.036)	(.035)	(.035)	(.036)	(.036)	(.043)
		15	0.882	0.875	0.875	0.875	0.881	0.883	0.883	0.875	0.84
			(.055)	(.052)	(.052)	(.052)	(.045)	(.046)	(.045)	(.052)	(.056)
	MNAR	9	0.809	0.806	0.807	0.807	0.82	0.82	0.823	0.81	0.778
			(.072)	(.078)	(.078)	(.077)	(.076)	(.075)	(.074)	(.076)	(.064)
		11	0.831	0.819	0.822	0.823	0.817	0.823	0.822	0.822	0.782
			(.068)	(.072)	(.069)	(.069)	(.078)	(.071)	(.071)	(.071)	(.065)
		12	0.74	0.734	0.734	0.734	0.742	0.741	0.737	0.733	0.703
			(.079)	(.086)	(.086)	(.086)	(.086)	(.082)	(.086)	(.086)	(.072)
		13	0.732	0.742	0.738	0.738	0.748	0.746	0.745	0.737	0.708
			(.090)	(.089)	(.090)	(.091)	(.089)	(.089)	(.087)	(.090)	(.076)
		15	0.711	0.693	0.69	0.69	0.7	0.701	0.7	0.693	0.653
			(.089)	(.094)	(.098)	(.098)	(.101)	(.108)	(.109)	(.093)	(.081)

Table S9. The imputation performances for quantitative variables 1, 3, 5, 7, and 8 under the condition $\rho = 0$, missing rate 20%, $N = 500$, and 3 missing mechanisms (MCAR, MAR, and MNAR). The mean and standard deviation (in parentheses), taken over 100 replicates, of PCC_p under Methods M_1 to M_9 are listed for each of the variables. Imputation methods: M_1: *rpart* with surrogate variables; M_2: GI (RSS) + majority rule; M_3: GI (RSS) + RE algorithm; M_4: GI (RSS) + H-RE algorithm; M_5: CHI + majority rule; M_6: CHI + RE algorithm; M_7: CHI + H-RE algorithm; M_8: iterative imputation; M_9: *mice* with cart option.

ρ	Types	Variables	Imputation Methods								
			M_1	M_2	M_3	M_4	M_5	M_6	M_7	M_8	M_9
0	MCAR	1	1.054	1.082	1.069	1.030	1.073	1.031	1.032	1.043	1.125
			(.080)	(.081)	(.080)	(.073)	(.079)	(.072)	(.071)	(.077)	(.078)
		3	1.058	1.088	1.078	1.054	1.079	1.053	1.052	1.049	1.144
			(.070)	(.079)	(.076)	(.068)	(.075)	(.069)	(.069)	(.072)	(.081)
		5	1.051	1.082	1.067	1.033	1.073	1.038	1.033	1.042	1.137
			(.074)	(.080)	(.079)	(.077)	(.076)	(.076)	(.077)	(.074)	(.078)
		7	1.046	1.073	1.064	1.032	1.064	1.032	1.033	1.040	1.128
			(.080)	(.075)	(.078)	(.074)	(.073)	(.076)	(.074)	(.071)	(.080)
		8	1.030	1.058	1.052	1.019	1.055	1.020	1.020	1.023	1.111
			(.070)	(.075)	(.076)	(.067)	(.075)	(.067)	(.067)	(.069)	(.085)
	MAR	1	1.054	1.111	1.097	1.046	1.111	1.053	1.048	1.076	1.150
			(.070)	(.099)	(.100)	(.077)	(.102)	(.076)	(.077)	(.102)	(.094)
		3	1.056	1.112	1.102	1.054	1.109	1.055	1.052	1.086	1.149
			(.084)	(.101)	(.110)	(.091)	(.110)	(.086)	(.087)	(.106)	(.097)
		5	1.046	1.083	1.073	1.037	1.090	1.039	1.045	1.062	1.138
			(.081)	(.091)	(.095)	(.082)	(.101)	(.083)	(.090)	(.099)	(.087)
		7	1.053	1.090	1.088	1.039	1.103	1.045	1.045	1.066	1.123
			(.073)	(.072)	(.086)	(.069)	(.092)	(.075)	(.073)	(.078)	(.076)
		8	1.048	1.084	1.086	1.039	1.094	1.042	1.045	1.065	1.144
			(.088)	(.092)	(.107)	(.086)	(.102)	(.089)	(.094)	(.102)	(.095)
	MNAR	1	1.706	1.720	1.713	1.701	1.720	1.712	1.703	1.706	1.754
			(.078)	(.082)	(.089)	(.088)	(.089)	(.087)	(.089)	(.077)	(.083)
		3	1.702	1.713	1.713	1.699	1.708	1.693	1.698	1.701	1.735
			(.076)	(.086)	(.089)	(.076)	(.091)	(.074)	(.073)	(.075)	(.079)
		5	1.706	1.713	1.708	1.706	1.71	1.709	1.705	1.702	1.737
			(.076)	(.084)	(.086)	(.080)	(.088)	(.084)	(.081)	(.078)	(.081)
		7	1.698	1.715	1.713	1.698	1.713	1.695	1.697	1.695	1.733
			(.069)	(.073)	(.081)	(.074)	(.078)	(.072)	(.076)	(.076)	(.082)
		8	1.704	1.713	1.716	1.698	1.712	1.701	1.698	1.696	1.737
			(.077)	(.083)	(.086)	(.084)	(.087)	(.083)	(.085)	(.077)	(.091)

Table S10. The imputation performances for quantitative variables 1, 3, 5, 7, and 8 under the condition $\rho = 0.3$, missing rate 20%, $N = 500$, and 3 missing mechanisms (MCAR, MAR, and MNAR). The mean and standard deviation (in parentheses), taken over 100 replicates, of PCC_p under Methods M_1 to M_9 are listed for each of the variables. Imputation methods: M_1: *rpart* with surrogate variables; M_2: GI (RSS) + majority rule; M_3: GI (RSS) + RE algorithm; M_4: GI (RSS) + H-RE algorithm; M_5: CHI + majority rule; M_6: CHI + RE algorithm; M_7: CHI + H-RE algorithm; M_8: iterative imputation; M_9: *mice* with cart option.

ρ	Types	Variables	Imputation Methods								
			M_1	M_2	M_3	M_4	M_5	M_6	M_7	M_8	M_9
0.3	MCAR	1	0.902	0.901	0.915	0.928	0.92	0.91	0.93	0.869	0.805
			(.066)	(.071)	(.071)	(.070)	(.071)	(.074)	(.070)	(.071)	(.064)
		3	0.894	0.897	0.918	0.915	0.918	0.904	0.916	0.872	0.806
			(.064)	(.067)	(.070)	(.068)	(.068)	(.068)	(.069)	(.078)	(.059)
		5	0.875	0.869	0.908	0.904	0.901	0.883	0.905	0.845	0.698
			(.065)	(.068)	(.064)	(.071)	(.066)	(.071)	(.068)	(.078)	(.056)
		7	0.937	0.943	0.957	0.967	0.957	0.95	0.969	0.905	0.845
			(.067)	(.071)	(.070)	(.075)	(.074)	(.074)	(.076)	(.072)	(.060)
		8	0.916	0.92	0.936	0.939	0.94	0.928	0.947	0.896	0.897
			(.068)	(.063)	(.066)	(.067)	(.064)	(.061)	(.071)	(.066)	(.062)
	MAR	1	1.012	1.033	1.045	1.048	1.058	1.042	1.05	1.042	0.957
			(.100)	(.113)	(.134)	(.116)	(.135)	(.111)	(.115)	(.109)	(.070)
		3	0.968	0.984	1.013	1.029	1.014	0.997	1.019	1.006	0.906
			(.083)	(.089)	(.113)	(.113)	(.111)	(.097)	(.114)	(.107)	(.075)
		5	0.971	1.006	1.005	1.035	1.016	1.005	1.035	0.967	0.817
			(.102)	(.119)	(.111)	(.109)	(.117)	(.111)	(.116)	(.093)	(.068)
		7	1.05	1.041	1.063	1.062	1.055	1.039	1.062	1.024	0.953
			(.100)	(.098)	(.110)	(.106)	(.099)	(.094)	(.106)	(.093)	(.076)
		8	0.952	0.972	0.976	0.969	0.985	0.964	0.97	0.956	0.951
			(.084)	(.077)	(.083)	(.081)	(.080)	(.083)	(.082)	(.097)	(.070)
	MNAR	1	1.432	1.425	1.525	1.537	1.524	1.46	1.543	1.397	1.324
			(.091)	(.095)	(.098)	(.094)	(.101)	(.102)	(.096)	(.098)	(.095)
		3	1.408	1.4	1.423	1.448	1.422	1.443	1.448	1.356	1.258
			(.079)	(.088)	(.103)	(.100)	(.097)	(.089)	(.101)	(.076)	(.077)
		5	1.34	1.33	1.377	1.402	1.369	1.366	1.404	1.332	1.155
			(.084)	(.082)	(.102)	(.101)	(.099)	(.088)	(.108)	(.091)	(.068)
		7	1.489	1.486	1.547	1.574	1.545	1.542	1.572	1.45	1.363
			(.081)	(.083)	(.093)	(.103)	(.095)	(.091)	(.104)	(.089)	(.077)
		8	1.471	1.466	1.555	1.582	1.559	1.515	1.579	1.44	1.423
			(.084)	(.081)	(.083)	(.081)	(.086)	(.081)	(.081)	(.075)	(.076)

Table S11. The imputation performances for quantitative variables 1, 3, 5, 7, and 8 under the condition $\rho = 0.5$, missing rate 20%, $N = 500$, and 3 missing mechanisms (MCAR, MAR, and MNAR). The mean and standard deviation (in parentheses), taken over 100 replicates, of PCC_p under Methods M_1 to M_9 are listed for each of the variables. Imputation methods: M_1: *rpart* with surrogate variables; M_2: GI (RSS) + majority rule; M_3: GI (RSS) + RE algorithm; M_4: GI (RSS) + H-RE algorithm; M_5: CHI + majority rule; M_6: CHI + RE algorithm; M_7: CHI + H-RE algorithm; M_8: iterative imputation; M_9: *mice* with cart option.

ρ	Types	Variables	Imputation Methods								
			M_1	M_2	M_3	M_4	M_5	M_6	M_7	M_8	M_9
0.5	MCAR	1	0.838	0.858	0.862	0.867	0.858	0.863	0.867	0.828	0.852
			(.064)	(.071)	(.067)	(.068)	(.068)	(.070)	(.067)	(.062)	(.067)
		3	0.798	0.812	0.835	0.842	0.832	0.815	0.84	0.784	0.777
			(.057)	(.056)	(.057)	(.067)	(.056)	(.059)	(.065)	(.065)	(.060)
		5	0.794	0.795	0.81	0.814	0.808	0.802	0.814	0.788	0.803
			(.066)	(.067)	(.063)	(.067)	(.066)	(.066)	(.061)	(.063)	(.066)
		7	0.807	0.809	0.813	0.821	0.811	0.819	0.818	0.801	0.828
			(.066)	(.059)	(.063)	(.065)	(.064)	(.060)	(.064)	(.062)	(.062)
		8	0.821	0.822	0.829	0.831	0.831	0.824	0.833	0.806	0.82
			(.057)	(.064)	(.061)	(.061)	(.061)	(.063)	(.060)	(.064)	(.062)
	MAR	1	0.876	0.906	0.905	0.92	0.902	0.927	0.921	0.87	0.891
			(.071)	(.089)	(.093)	(.092)	(.084)	(.101)	(.090)	(.077)	(.072)
		3	0.816	0.841	0.852	0.861	0.853	0.85	0.862	0.798	0.8
			(.066)	(.082)	(.090)	(.099)	(.103)	(.091)	(.107)	(.065)	(.060)
		5	0.819	0.825	0.825	0.835	0.824	0.832	0.835	0.811	0.84
			(.063)	(.066)	(.065)	(.070)	(.064)	(.068)	(.069)	(.065)	(.066)
		7	0.839	0.847	0.85	0.855	0.851	0.856	0.856	0.841	0.873
			(.064)	(.076)	(.077)	(.069)	(.078)	(.069)	(.068)	(.067)	(.068)
		8	0.873	0.875	0.877	0.901	0.882	0.898	0.91	0.861	0.866
			(.072)	(.075)	(.069)	(.075)	(.073)	(.079)	(.081)	(.074)	(.064)
	MNAR	1	1.323	1.326	1.349	1.386	1.354	1.361	1.384	1.286	1.293
			(.073)	(.076)	(.084)	(.097)	(.087)	(.080)	(.093)	(.079)	(.077)
		3	1.248	1.255	1.254	1.287	1.255	1.283	1.289	1.201	1.165
			(.076)	(.082)	(.096)	(.106)	(.089)	(.088)	(.108)	(.076)	(.079)
		5	1.249	1.244	1.223	1.241	1.22	1.264	1.241	1.216	1.192
			(.077)	(.079)	(.080)	(.092)	(.082)	(.086)	(.092)	(.082)	(.079)
		7	1.258	1.247	1.238	1.272	1.238	1.291	1.268	1.237	1.236
			(.069)	(.066)	(.068)	(.074)	(.066)	(.073)	(.077)	(.067)	(.066)
		8	1.281	1.267	1.302	1.333	1.307	1.299	1.341	1.242	1.246
			(.061)	(.070)	(.079)	(.083)	(.081)	(.075)	(.089)	(.073)	(.068)

Table S12. The imputation performances for quantitative variables 1, 3, 5, 7, and 8 under the condition $\rho = 0.7$, missing rate 20%, $N = 500$, and 3 missing mechanisms (MCAR, MAR, and MNAR). The mean and standard deviation (in parentheses), taken over 100 replicates, of PCC_p under Methods M_1 to M_9 are listed for each of the variables. Imputation methods: M_1: *rpart* with surrogate variables; M_2: GI (RSS) + majority rule; M_3: GI (RSS) + RE algorithm; M_4: GI (RSS) + H-RE algorithm; M_5: CHI + majority rule; M_6: CHI + RE algorithm; M_7: CHI + H-RE algorithm; M_8: iterative imputation; M_9: *mice* with cart option.

ρ	Types	Variables	Imputation Methods								
			M_1	M_2	M_3	M_4	M_5	M_6	M_7	M_8	M_9
0.7	MCAR	1	0.67	0.677	0.683	0.688	0.683	0.682	0.688	0.669	0.677
			(.048)	(.048)	(.049)	(.049)	(.049)	(.048)	(.049)	(.047)	(.048)
		3	0.597	0.599	0.609	0.634	0.609	0.618	0.634	0.598	0.548
			(.048)	(.052)	(.056)	(.053)	(.055)	(.047)	(.053)	(.048)	(.043)
		5	0.652	0.654	0.665	0.712	0.665	0.689	0.706	0.648	0.654
			(.043)	(.044)	(.046)	(.066)	(.046)	(.059)	(.064)	(.045)	(.047)
		7	0.638	0.631	0.637	0.639	0.637	0.634	0.639	0.635	0.615
			(.047)	(.047)	(.049)	(.047)	(.049)	(.047)	(.048)	(.048)	(.049)
		8	0.619	0.61	0.614	0.621	0.614	0.62	0.621	0.616	0.629
			(.042)	(.044)	(.045)	(.046)	(.044	(.045)	(.046)	(.044)	(.047)
	MAR	1	0.709	0.713	0.715	0.727	0.714	0.724	0.724	0.699	0.713
			(.059)	(.061)	(.065)	(.069)	(.064)	(.064)	(.069)	(.062)	(.049)
		3	0.663	0.659	0.658	0.686	0.658	0.686	0.687	0.649	0.596
			(.058)	(.058)	(.057)	(.061)	(.057)	(.060)	(.061)	(.061)	(.058)
		5	0.727	0.745	0.748	0.784	0.747	0.764	0.782	0.721	0.719
			(.067)	(.089)	(.098)	(.113)	(.097)	(.085)	(.112)	(.079)	(.062)
		7	0.759	0.743	0.755	0.774	0.748	0.767	0.772	0.754	0.697
			(.074)	(.077)	(.079)	(.088)	(.077	(.087)	(.088)	(.091)	(.065)
		8	0.733	0.72	0.721	0.735	0.722	0.733	0.735	0.72	0.694
			(.072)	(.073)	(.075)	(.078)	(.075)	(.076)	(.078)	(.070)	(.060)
	MNAR	1	1.046	1.028	1.042	1.072	1.044	1.052	1.073	1.008	0.978
			(.080)	(.084)	(.087)	(.099)	(.090)	(.085)	(.102)	(.089)	(.074)
		3	0.932	0.92	0.931	0.952	0.93	0.937	0.951	0.91	0.791
			(.075)	(.080)	(.088)	(.105)	(.088)	(.086)	(.106)	(.093)	(.068)
		5	1.009	1	0.992	1.055	0.992	1.055	1.054	0.986	0.957
			(.083)	(.085)	(.084)	(.087)	(.084)	(.084)	(.086)	(.081)	(.082)
		7	0.985	0.965	0.97	0.989	0.969	0.984	0.989	0.963	0.901
			(.081)	(.083)	(.081)	(.083)	(.081)	(.081)	(.084)	(.081)	(.080)
		8	0.965	0.938	0.939	0.965	0.939	0.965	0.964	0.939	0.89
			(.068)	(.075)	(.075)	(.074)	(.075)	(.074)	(.075)	(.077)	(.077)

Table S13. The imputation performances for quantitative variables 1, 3, 5, 7, and 8 under the condition $\rho = 0$, missing rate 30%, $N = 500$, and 3 missing mechanisms (MCAR, MAR, and MNAR). The mean and standard deviation (in parentheses), taken over 100 replicates, of $RMSE_p$ under Methods M_1 to M_9 are listed for each of the variables. Imputation methods: M_1: *rpart* with surrogate variables; M_2: GI (RSS) + majority rule; M_3: GI (RSS) + RE algorithm; M_4: GI (RSS) + H-RE algorithm; M_5: CHI + majority rule; M_6: CHI + RE algorithm; M_7: CHI + H-RE algorithm; M_8: iterative imputation; M_9: *mice* with cart option.

ρ	Types	Variables	Imputation Methods								
			M_1	M_2	M_3	M_4	M_5	M_6	M_7	M_8	M_9
0	MCAR	1	1.05	1.078	1.064	1.037	1.066	1.041	1.038	1.049	1.127
			(.061)	(.070)	(.070)	(.062)	(.069)	(.060)	(.062)	(.069)	(.070)
		3	1.058	1.084	1.068	1.045	1.074	1.047	1.047	1.057	1.134
			(.056)	(.061)	(.062)	(.061)	(.062)	(.060)	(.059)	(.060)	(.064)
		5	1.047	1.081	1.059	1.036	1.061	1.039	1.035	1.044	1.12
			(.058)	(.062)	(.063)	(.060)	(.066)	(.068)	(.063)	(.061)	(.066)
		7	1.045	1.076	1.06	1.036	1.063	1.04	1.036	1.051	1.126
			(.066)	(.063)	(.064)	(.059)	(.064)	(.062)	(.059)	(.062)	(.067)
		8	1.04	1.071	1.055	1.026	1.056	1.03	1.025	1.042	1.115
			(.059)	(.066)	(.067)	(.059)	(.068)	(.058)	(.061)	(.063)	(.068)
	MAR	1	1.044	1.075	1.076	1.038	1.08	1.037	1.037	1.053	1.129
			(.064)	(.067)	(.078)	(.060)	(.082)	(.060)	(.059)	(.065)	(.069)
		3	1.056	1.09	1.075	1.041	1.079	1.054	1.043	1.07	1.137
			(.061)	(.081)	(.072)	(.057)	(.077)	(.066)	(.058)	(.070)	(.071)
		5	1.049	1.081	1.069	1.04	1.08	1.042	1.04	1.054	1.128
			(.064)	(.070)	(.075)	(.062)	(.088)	(.065)	(.064)	(.071)	(.075)
		7	1.05	1.087	1.076	1.034	1.083	1.041	1.036	1.063	1.13
			(.056)	(.074)	(.077)	(.066)	(.083)	(.073)	(.069)	(.069)	(.064)
		8	1.043	1.07	1.071	1.03	1.067	1.031	1.03	1.051	1.118
			(.065)	(.071)	(.087)	(.068)	(.077)	(.067)	(.064)	(.068)	(.066)
	MNAR	1	1.541	1.558	1.545	1.535	1.542	1.541	1.534	1.546	1.578
			(.072)	(.087)	(.087)	(.084)	(.089)	(.082)	(.077)	(.075)	(.081)
		3	1.544	1.549	1.549	1.54	1.548	1.536	1.537	1.539	1.581
			(.070)	(.083)	(.086)	(.074)	(.092)	(.071)	(.071)	(.072)	(.073)
		5	1.541	1.557	1.557	1.536	1.561	1.538	1.537	1.541	1.575
			(.066)	(.077)	(.079)	(.072)	(.080)	(.070)	(.074)	(.073)	(.070)
		7	1.532	1.55	1.542	1.521	1.542	1.525	1.524	1.535	1.567
			(.070)	(.081)	(.084)	(.081)	(.085)	(.068)	(.079)	(.075)	(.075)
		8	1.537	1.555	1.544	1.532	1.544	1.533	1.532	1.541	1.576
			(.078)	(.074)	(.074)	(.074)	(.080)	(.076)	(.076)	(.075)	(.074)

Table S14. The imputation performances for quantitative variables 1, 3, 5, 7, and 8 under the condition $\rho = 0.3$, missing rate 30%, $N = 500$, and 3 missing mechanisms (MCAR, MAR, and MNAR). The mean and standard deviation (in parentheses), taken over 100 replicates, of $RMSE_p$ under Methods M_1 to M_9 are listed for each of the variables. Imputation methods: M_1: *rpart* with surrogate variables; M_2: GI (RSS) + majority rule; M_3: GI (RSS) + RE algorithm; M_4: GI (RSS) + H-RE algorithm; M_5: CHI + majority rule; M_6: CHI + RE algorithm; M_7: CHI + H-RE algorithm; M_8: iterative imputation; M_9: *mice* with cart option.

ρ	Types	Variables	Imputation Methods								
			M_1	M_2	M_3	M_4	M_5	M_6	M_7	M_8	M_9
0.3	MCAR	1	0.918	0.919	0.942	0.942	0.942	0.929	0.942	0.908	0.838
			(.059)	(.054)	(.062)	(.057)	(.060)	(.053)	(.056)	(.072)	(.062)
		3	0.901	0.91	0.936	0.932	0.933	0.918	0.932	0.905	0.84
			(.054)	(.061)	(.067)	(.061)	(.065)	(.059)	(.063)	(.071)	(.051)
		5	0.888	0.891	0.922	0.923	0.918	0.896	0.923	0.88	0.736
			(.052)	(.058)	(.067)	(.069)	(.063)	(.061)	(.069)	(.077)	(.047)
		7	0.96	0.96	0.982	0.991	0.988	0.97	0.992	0.933	0.874
			(.061)	(.057)	(.063)	(.065)	(.064)	(.062)	(.061)	(.074)	(.054)
		8	0.94	0.952	0.965	0.97	0.964	0.955	0.967	0.932	0.918
			(.053)	(.057)	(.061)	(.057)	(.062)	(.058)	(.059)	(.062)	(.050)
	MAR	1	0.981	1.01	1.026	1.03	1.032	1.011	1.032	1.021	0.93
			(.087)	(.083)	(.112)	(.106)	(.110)	(.092)	(.101)	(.095)	(.063)
		3	0.946	0.953	0.968	0.977	0.972	0.964	0.977	0.989	0.888
			(.063)	(.070)	(.073)	(.091)	(.079)	(.079)	(.092)	(.095)	(.062)
		5	0.96	0.982	1.014	1.024	1.012	0.992	1.031	0.988	0.811
			(.079)	(.101)	(.117)	(.110)	(.110)	(.105)	(.109)	(.110)	(.062)
		7	1.031	1.034	1.052	1.059	1.062	1.041	1.067	1.032	0.935
			(.083)	(.097)	(.100)	(.097)	(.108)	(.103)	(.115)	(.093)	(.067)
		8	0.962	0.975	0.972	0.967	0.976	0.972	0.968	0.966	0.941
			(.069)	(.068)	(.070)	(.061)	(.074)	(.063)	(.059)	(.074)	(.062)
	MNAR	1	1.33	1.305	1.425	1.434	1.426	1.343	1.432	1.28	1.241
			(.083)	(.086)	(.102)	(.106)	(.102)	(.087)	(.101)	(.090)	(.080)
		3	1.292	1.282	1.3	1.333	1.299	1.318	1.332	1.249	1.186
			(.087)	(.086)	(.108)	(.107)	(.105)	(.090)	(.108)	(.083)	(.079)
		5	1.234	1.237	1.294	1.314	1.293	1.272	1.314	1.234	1.088
			(.071)	(.073)	(.101)	(.104)	(.095)	(.081)	(.106)	(.086)	(.062)
		7	1.368	1.36	1.435	1.454	1.438	1.412	1.457	1.335	1.27
			(.078)	(.074)	(.087)	(.086)	(.087)	(.079)	(.084)	(.074)	(.066)
		8	1.357	1.352	1.43	1.461	1.431	1.386	1.461	1.324	1.318
			(.076)	(.074)	(.091)	(.099)	(.091)	(.083)	(.095)	(.077)	(.067)

Table S15. The imputation performances for quantitative variables 1, 3, 5, 7, and 8 under the condition $\rho = 0.5$, missing rate 30%, $N = 500$, and 3 missing mechanisms (MCAR, MAR, and MNAR). The mean and standard deviation (in parentheses), taken over 100 replicates, of $RMSE_p$ under Methods M_1 to M_9 are listed for each of the variables. Imputation methods: M_1: *rpart* with surrogate variables; M_2: GI (RSS) + majority rule; M_3: GI (RSS) + RE algorithm; M_4: GI (RSS) + H-RE algorithm; M_5: CHI + majority rule; M_6: CHI + RE algorithm; M_7: CHI + H-RE algorithm; M_8: iterative imputation; M_9: *mice* with cart option.

ρ	Types	Variables	Imputation Methods								
			M_1	M_2	M_3	M_4	M_5	M_6	M_7	M_8	M_9
0.5	MCAR	1	0.853	0.866	0.879	0.881	0.878	0.876	0.883	0.86	0.859
			(.050)	(.051)	(.052)	(.050)	(.051)	(.055)	(.052)	(.051)	(.052)
		3	0.812	0.826	0.85	0.862	0.848	0.83	0.859	0.822	0.784
			(.048)	(.046)	(.052)	(.058)	(.052)	(.051)	(.058)	(.056)	(.047)
		5	0.816	0.821	0.834	0.839	0.832	0.82	0.838	0.819	0.817
			(.058)	(.062)	(.062)	(.059)	(.062)	(.053)	(.058)	(.056)	(.055)
		7	0.815	0.818	0.828	0.833	0.829	0.828	0.833	0.828	0.827
			(.047)	(.049)	(.050)	(.050)	(.051)	(.049)	(.050)	(.053)	(.052)
		8	0.837	0.839	0.854	0.854	0.85	0.85	0.853	0.84	0.831
			(.053)	(.049)	(.054)	(.057)	(.052)	(.054)	(.057)	(.060)	(.054)
	MAR	1	0.873	0.886	0.893	0.903	0.896	0.899	0.906	0.878	0.881
			(.061)	(.065)	(.072)	(.074)	(.071)	(.069)	(.078)	(.065)	(.058)
		3	0.83	0.846	0.86	0.866	0.856	0.851	0.865	0.831	0.799
			(.051)	(.061)	(.070)	(.076)	(.069)	(.066)	(.076)	(.061)	(.058)
		5	0.829	0.836	0.838	0.84	0.836	0.837	0.839	0.825	0.838
			(.059)	(.061)	(.057)	(.059)	(.059)	(.058)	(.059)	(.059)	(.056)
		7	0.838	0.84	0.841	0.864	0.842	0.858	0.864	0.842	0.85
			(.060)	(.063)	(.064)	(.074)	(.064)	(.071)	(.075)	(.061)	(.057)
		8	0.879	0.88	0.889	0.899	0.89	0.889	0.899	0.876	0.854
			(.053)	(.059)	(.064)	(.058)	(.063)	(.056)	(.058)	(.054)	(.062)
	MNAR	1	1.212	1.218	1.244	1.273	1.246	1.246	1.273	1.168	1.182
			(.066)	(.079)	(.102)	(.097)	(.104)	(.073)	(.094)	(.072)	(.069)
		3	1.146	1.139	1.14	1.165	1.141	1.162	1.163	1.076	1.07
			(.069)	(.079)	(.095)	(.091)	(.090)	(.067)	(.092)	(.075)	(.067)
		5	1.153	1.157	1.134	1.146	1.134	1.171	1.146	1.112	1.105
			(.074)	(.076)	(.084)	(.089)	(.084)	(.076)	(.089)	(.073)	(.072)
		7	1.154	1.15	1.136	1.162	1.135	1.182	1.162	1.143	1.128
			(.063)	(.065)	(.068)	(.076)	(.069)	(.074)	(.076)	(.066)	(.069)
		8	1.165	1.167	1.196	1.236	1.197	1.195	1.234	1.112	1.127
			(.070)	(.071)	(.087)	(.087)	(.088)	(.073)	(.086)	(.083)	(.068)

Table S16. The imputation performances for quantitative variables 1, 3, 5, 7, and 8 under the condition $\rho = 0.7$, missing rate 30%, $N = 500$, and 3 missing mechanisms (MCAR, MAR, and MNAR). The mean and standard deviation (in parentheses), taken over 100 replicates, of $RMSE_p$ under Methods M_1 to M_9 are listed for each of the variables. Imputation methods: M_1: *rpart* with surrogate variables; M_2: GI (RSS) + majority rule; M_3: GI (RSS) + RE algorithm; M_4: GI (RSS) + H-RE algorithm; M_5: CHI + majority rule; M_6: CHI + RE algorithm; M_7: CHI + H-RE algorithm; M_8: iterative imputation; M_9: *mice* with cart option.

ρ	Types	Variables	Imputation Methods								
			M_1	M_2	M_3	M_4	M_5	M_6	M_7	M_8	M_9
0.7	MCAR	1	0.68	0.686	0.694	0.698	0.695	0.692	0.698	0.682	0.679
			(.044)	(.045)	(.048)	(.048)	(.049)	(.043)	(.048)	(.050)	(.036)
		3	0.61	0.615	0.623	0.644	0.623	0.63	0.644	0.636	0.554
			(.039)	(.039)	(.040)	(.039)	(.040)	(.034)	(.039)	(.045)	(.033)
		5	0.665	0.668	0.679	0.722	0.678	0.701	0.722	0.667	0.654
			(.041)	(.039)	(.044)	(.056)	(.043)	(.047)	(.055)	(.042)	(.041)
		7	0.647	0.645	0.652	0.655	0.651	0.652	0.655	0.657	0.623
			(.034)	(.039)	(.038)	(.037)	(.039)	(.037)	(.037)	(.041)	(.035)
		8	0.625	0.622	0.623	0.631	0.623	0.63	0.631	0.629	0.627
			(.037)	(.037)	(.037)	(.037)	(.037)	(.037)	(.037)	(.040)	(.037)
	MAR	1	0.712	0.708	0.712	0.718	0.712	0.718	0.718	0.702	0.702
			(.053)	(.052)	(.054)	(.055)	(.054)	(.058)	(.055)	(.056)	(.049)
		3	0.668	0.667	0.667	0.682	0.667	0.683	0.682	0.66	0.579
			(.054)	(.053)	(.053)	(.051)	(.053)	(.054)	(.051)	(.055)	(.042)
		5	0.72	0.719	0.724	0.775	0.724	0.759	0.77	0.707	0.708
			(.053)	(.058)	(.067)	(.085)	(.071)	(.072)	(.087)	(.051)	(.054)
		7	0.734	0.724	0.728	0.742	0.728	0.739	0.742	0.728	0.668
			(.059)	(.061)	(.061)	(.064)	(.061)	(.064)	(.064)	(.061)	(.051)
		8	0.712	0.7	0.701	0.718	0.701	0.718	0.718	0.705	0.67
			(.057)	(.062)	(.062)	(.058)	(.062)	(.058)	(.058)	(.062)	(.046)
	MNAR	1	0.936	0.93	0.948	0.973	0.947	0.948	0.973	0.904	0.886
			(.071)	(.075)	(.084)	(.100)	(.082)	(.075)	(.100)	(.076)	(.058)
		3	0.834	0.827	0.833	0.857	0.832	0.854	0.857	0.813	0.712
			(.062)	(.075)	(.078)	(.075)	(.078)	(.073)	(.075)	(.089)	(.062)
		5	0.911	0.905	0.896	0.954	0.896	0.957	0.953	0.891	0.863
			(.074)	(.074)	(.074)	(.081)	(.074)	(.079)	(.082)	(.075)	(.069)
		7	0.881	0.861	0.865	0.882	0.866	0.881	0.882	0.846	0.803
			(.070)	(.070)	(.067)	(.073)	(.068)	(.075)	(.073)	(.081)	(.063)
		8	0.855	0.846	0.848	0.864	0.849	0.863	0.864	0.85	0.805
			(.068)	(.069)	(.069)	(.070)	(.069)	(.069)	(.070)	(.070)	(.060)

Table S17. The imputation performances for quantitative variables 1, 3, 5, 7, and 8 under the condition $\rho = 0$, missing rate 10%, $N = 1000$, and 3 missing mechanisms (MCAR, MAR, and MNAR). The mean and standard deviation (in parentheses), taken over 100 replicates, of $RMSE_p$ under Methods M_1 to M_9 are listed for each of the variables. Imputation methods: M_1: *rpart* with surrogate variables; M_2: GI (RSS) + majority rule; M_3: GI (RSS) + RE algorithm; M_4: GI (RSS) + H-RE algorithm; M_5: CHI + majority rule; M_6: CHI + RE algorithm; M_7: CHI + H-RE algorithm; M_8: iterative imputation; M_9: *mice* with cart option.

ρ	Types	Variables	Imputation Methods								
			M_1	M_2	M_3	M_4	M_5	M_6	M_7	M_8	M_9
0	MCAR	1	0.999	1.045	1.044	1.015	1.048	1.016	1.016	1.031	1.127
			(.065)	(.067)	(.071)	(.069)	(.068)	(.068)	(.066)	(.071)	(.080)
		3	1.006	1.048	1.043	1.021	1.041	1.022	1.021	1.034	1.125
			(.078)	(.081)	(.082)	(.077)	(.079)	(.077)	(.077)	(.080)	(.090)
		5	1.004	1.051	1.048	1.025	1.049	1.027	1.022	1.033	1.129
			(.063)	(.068)	(.066)	(.068)	(.069)	(.069)	(.069)	(.068)	(.073)
		7	1.002	1.049	1.045	1.021	1.05	1.024	1.022	1.031	1.125
			(.068)	(.072)	(.072)	(.069)	(.071)	(.070)	(.069)	(.070)	(.069)
		8	1.004	1.047	1.042	1.024	1.042	1.025	1.022	1.029	1.124
			(.064)	(.068)	(.065)	(.067)	(.068)	(.067)	(.069)	(.064)	(.064)
	MAR	1	1.007	1.063	1.059	1.027	1.077	1.022	1.026	1.05	1.136
			(.078)	(.081)	(.082)	(.081)	(.090)	(.083)	(.080)	(.081)	(.087)
		3	0.996	1.058	1.047	1.017	1.054	1.016	1.017	1.039	1.137
			(.072)	(.077)	(.073)	(.073)	(.079)	(.075)	(.074)	(.079)	(.089)
		5	1.014	1.065	1.063	1.03	1.075	1.034	1.033	1.053	1.139
			(.067)	(.081)	(.091)	(.071)	(.094)	(.072)	(.072)	(.077)	(.079)
		7	0.996	1.045	1.051	1.012	1.061	1.016	1.013	1.036	1.112
			(.066)	(.076)	(.080)	(.066)	(.079)	(.067)	(.068)	(.068)	(.073)
		8	0.998	1.049	1.049	1.02	1.054	1.02	1.021	1.037	1.131
			(.074)	(.083)	(.081)	(.073)	(.085)	(.076)	(.075)	(.087)	(.083)
	MNAR	1	1.649	1.671	1.671	1.655	1.672	1.654	1.655	1.662	1.72
			(.062)	(.072)	(.069)	(.065)	(.071)	(.065)	(.063)	(.071)	(.083)
		3	1.645	1.666	1.662	1.654	1.663	1.653	1.653	1.659	1.708
			(.058)	(.063)	(.064)	(.060)	(.066)	(.057)	(.061)	(.063)	(.072)
		5	1.64	1.663	1.664	1.646	1.664	1.648	1.649	1.658	1.703
			(.050)	(.058)	(.058)	(.054)	(.058)	(.052)	(.055)	(.053)	(.064)
		7	1.638	1.67	1.664	1.651	1.67	1.65	1.649	1.655	1.718
			(.073)	(.079)	(.086)	(.076)	(.086)	(.074)	(.076)	(.082)	(.080)
		8	1.633	1.66	1.656	1.646	1.655	1.645	1.644	1.651	1.702
			(.065)	(.069)	(.068)	(.067)	(.067)	(.069)	(.067)	(.068)	(.080)

Table S18. The imputation performances for quantitative variables 1, 3, 5, 7, and 8 under the condition $\rho = 0.3$, missing rate 10%, $N = 1000$, and 3 missing mechanisms (MCAR, MAR, and MNAR). The mean and standard deviation (in parentheses), taken over 100 replicates, of $RMSE_p$ under Methods M_1 to M_9 are listed for each of the variables. Imputation methods: M_1: *rpart* with surrogate variables; M_2: GI (RSS) + majority rule; M_3: GI (RSS) + RE algorithm; M_4: GI (RSS) + H-RE algorithm; M_5: CHI + majority rule; M_6: CHI + RE algorithm; M_7: CHI + H-RE algorithm; M_8: iterative imputation; M_9: *mice* with cart option.

ρ	Types	Variables	Imputation Methods								
			M_1	M_2	M_3	M_4	M_5	M_6	M_7	M_8	M_9
0.3	MCAR	1	0.864	0.863	0.88	0.878	0.88	0.865	0.878	0.835	0.723
			(.067)	(.068)	(.070)	(.069)	(.067)	(.067)	(.067)	(.064)	(.052)
		3	0.843	0.851	0.86	0.855	0.862	0.849	0.857	0.824	0.709
			(.067)	(.065)	(.066)	(.069)	(.068)	(.065)	(.068)	(.077)	(.060)
		5	0.82	0.833	0.845	0.846	0.845	0.832	0.847	0.796	0.606
			(.062)	(.062)	(.068)	(.067)	(.066)	(.062)	(.066)	(.071)	(.051)
		7	0.904	0.911	0.925	0.928	0.923	0.915	0.93	0.887	0.785
			(.067)	(.067)	(.067)	(.072)	(.069)	(.070)	(.072)	(.071)	(.056)
		8	0.886	0.885	0.894	0.895	0.893	0.891	0.889	0.862	0.851
			(.066)	(.065)	(.068)	(.068)	(.068)	(.068)	(.069)	(.071)	(.070)
	MAR	1	0.959	0.96	0.982	0.985	0.979	0.964	0.987	0.98	0.854
			(.077)	(.072)	(.088)	(.085)	(.086)	(.075)	(.079)	(.082)	(.061)
		3	0.919	0.931	0.953	0.953	0.944	0.933	0.947	0.922	0.798
			(.063)	(.068)	(.084)	(.082)	(.082)	(.074)	(.085)	(.075)	(.067)
		5	0.905	0.927	0.953	0.954	0.952	0.93	0.946	0.921	0.697
			(.074)	(.092)	(.094)	(.098)	(.093)	(.091)	(.085)	(.094)	(.062)
		7	0.979	0.99	0.996	1	0.995	0.991	1.006	0.975	0.862
			(.084)	(.085)	(.080)	(.080)	(.084)	(.082)	(.081)	(.081)	(.065)
		8	0.924	0.925	0.93	0.933	0.931	0.928	0.928	0.917	0.902
			(.061)	(.066)	(.067)	(.072)	(.065)	(.070)	(.067)	(.063)	(.060)
	MNAR	1	1.299	1.316	1.384	1.389	1.383	1.317	1.391	1.268	1.072
			(.083)	(.088)	(.098)	(.098)	(.099)	(.088)	(.099)	(.086)	(.071)
		3	1.274	1.286	1.292	1.298	1.292	1.299	1.298	1.24	1.021
			(.080)	(.080)	(.096)	(.097)	(.094)	(.083)	(.097)	(.081)	(.076)
		5	1.213	1.224	1.257	1.251	1.249	1.224	1.252	1.196	0.879
			(.073)	(.076)	(.093)	(.087)	(.091)	(.076)	(.087)	(.077)	(.065)
		7	1.379	1.378	1.43	1.434	1.423	1.39	1.437	1.35	1.143
			(.089)	(.083)	(.085)	(.085)	(.084)	(.082)	(.087)	(.089)	(.081)
		8	1.366	1.356	1.439	1.441	1.424	1.376	1.443	1.337	1.254
			(.067)	(.070)	(.072)	(.070)	(.070)	(.068)	(.070)	(.062)	(.068)

Table S19. The imputation performances for quantitative variables 1, 3, 5, 7, and 8 under the condition $\rho = 0.5$, missing rate 10%, $N = 1000$, and 3 missing mechanisms (MCAR, MAR, and MNAR). The mean and standard deviation (in parentheses), taken over 100 replicates, of $RMSE_p$ under Methods M_1 to M_9 are listed for each of the variables. Imputation methods: M_1: *rpart* with surrogate variables; M_2: GI (RSS) + majority rule; M_3: GI (RSS) + RE algorithm; M_4: GI (RSS) + H-RE algorithm; M_5: CHI + majority rule; M_6: CHI + RE algorithm; M_7: CHI + H-RE algorithm; M_8: iterative imputation; M_9: *mice* with cart option.

ρ	Types	Variables	Imputation Methods								
			M_1	M_2	M_3	M_4	M_5	M_6	M_7	M_8	M_9
0.5	MCAR	1	0.816	0.82	0.826	0.825	0.826	0.823	0.823	0.8	0.844
			(.053)	(.055)	(.056)	(.058)	(.056)	(.056)	(.056)	(.055)	(.055)
		3	0.774	0.783	0.793	0.818	0.794	0.799	0.813	0.765	0.765
			(.058)	(.058)	(.063)	(.063)	(.056)	(.063)	(.062)	(.055)	(.059)
		5	0.781	0.78	0.789	0.796	0.785	0.78	0.788	0.775	0.812
			(.056)	(.053)	(.057)	(.064)	(.056)	(.056)	(.056)	(.061)	(.061)
		7	0.8	0.797	0.801	0.8	0.799	0.795	0.799	0.784	0.825
			(.059)	(.055)	(.057)	(.053)	(.057)	(.052)	(.053)	(.060)	(.060)
		8	0.801	0.799	0.804	0.805	0.801	0.802	0.803	0.784	0.808
			(.058)	(.054)	(.058)	(.056)	(.058)	(.055)	(.057)	(.054)	(.056)
	MAR	1	0.85	0.856	0.874	0.874	0.857	0.858	0.867	0.841	0.862
			(.060)	(.068)	(.077)	(.074)	(.075)	(.070)	(.073)	(.059)	(.053)
		3	0.806	0.822	0.831	0.857	0.821	0.829	0.836	0.796	0.784
			(.062)	(.064)	(.069)	(.078)	(.066)	(.065)	(.069)	(.064)	(.065)
		5	0.798	0.792	0.797	0.8	0.788	0.796	0.79	0.781	0.826
			(.055)	(.054)	(.055)	(.053)	(.054)	(.048)	(.050)	(.054)	(.057)
		7	0.841	0.833	0.836	0.843	0.836	0.842	0.843	0.829	0.859
			(.061)	(.063)	(.063)	(.063)	(.065)	(.062)	(.063)	(.058)	(.061)
		8	0.836	0.835	0.844	0.85	0.842	0.838	0.847	0.829	0.829
			(.065)	(.062)	(.066)	(.067)	(.068)	(.064)	(.066)	(.059)	(.061)
	MNAR	1	1.217	1.217	1.244	1.263	1.245	1.239	1.264	1.179	1.169
			(.062)	(.079)	(.090)	(.086)	(.086)	(.081)	(.087)	(.066)	(.066)
		3	1.124	1.131	1.14	1.164	1.128	1.156	1.149	1.095	1.009
			(.062)	(.066)	(.072)	(.073)	(.068)	(.067)	(.071)	(.054)	(.053)
		5	1.122	1.114	1.097	1.112	1.09	1.133	1.105	1.089	1.077
			(.060)	(.063)	(.065)	(.061)	(.063)	(.060)	(.061)	(.059)	(.060)
		7	1.175	1.156	1.144	1.156	1.141	1.174	1.157	1.14	1.136
			(.066)	(.061)	(.062)	(.067)	(.064)	(.065)	(.069)	(.068)	(.077)
		8	1.175	1.162	1.206	1.213	1.201	1.175	1.214	1.146	1.111
			(.065)	(.061)	(.066)	(.068)	(.065)	(.061)	(.067)	(.067)	(.064)

Table S20. The imputation performances for quantitative variables 1, 3, 5, 7, and 8 under the condition $\rho = 0.7$, missing rate 10%, $N = 1000$, and 3 missing mechanisms (MCAR, MAR, and MNAR). The mean and standard deviation (in parentheses), taken over 100 replicates, of $RMSE_p$ under Methods M_1 to M_9 are listed for each of the variables. Imputation methods: M_1: *rpart* with surrogate variables; M_2: GI (RSS) + majority rule; M_3: GI (RSS) + RE algorithm; M_4: GI (RSS) + H-RE algorithm; M_5: CHI + majority rule; M_6: CHI + RE algorithm; M_7: CHI + H-RE algorithm; M_8: iterative imputation; M_9: *mice* with cart option.

ρ	Types	Variables	Imputation Methods								
			M_1	M_2	M_3	M_4	M_5	M_6	M_7	M_8	M_9
0.7	MCAR	1	0.656	0.654	0.658	0.66	0.66	0.657	0.66	0.647	0.673
			(.044)	(.046)	(.045)	(.046)	(.044)	(.047)	(.046)	(.043)	(.049)
		3	0.574	0.571	0.575	0.622	0.575	0.612	0.621	0.576	0.524
			(.050)	(.051)	(.053)	(.057)	(.051)	(.056)	(.058)	(.052)	(.045)
		5	0.64	0.639	0.646	0.708	0.645	0.679	0.696	0.633	0.658
			(.048)	(.048)	(.050)	(.054)	(.050)	(.050)	(.054)	(.051)	(.050)
		7	0.628	0.62	0.622	0.623	0.622	0.62	0.623	0.621	0.598
			(.050)	(.048)	(.049)	(.051)	(.050)	(.050)	(.051)	(.051)	(.043)
		8	0.613	0.604	0.605	0.606	0.605	0.605	0.606	0.603	0.612
			(.042)	(.041)	(.041)	(.042)	(.041)	(.042)	(.042)	(.041)	(.041)
	MAR	1	0.688	0.684	0.683	0.684	0.683	0.685	0.685	0.675	0.703
			(.050)	(.052)	(.052)	(.052)	(.054)	(.052)	(.052)	(.054)	(.054)
		3	0.64	0.635	0.635	0.659	0.634	0.659	0.659	0.631	0.576
			(.058)	(.057)	(.057)	(.059)	(.057)	(.059)	(.059)	(.056)	(.045)
		5	0.7	0.696	0.711	0.74	0.705	0.731	0.741	0.689	0.699
			(.050)	(.054)	(.063)	(.065)	(.064)	(.057)	(.066)	(.050)	(.053)
		7	0.701	0.692	0.695	0.696	0.693	0.695	0.696	0.696	0.643
			(.057)	(.058)	(.057)	(.056)	(.058)	(.056)	(.056)	(.064)	(.050)
		8	0.677	0.665	0.665	0.669	0.665	0.669	0.669	0.665	0.659
			(.060)	(.058)	(.058)	(.059)	(.058)	(.059)	(.059)	(.058)	(.048)
	MNAR	1	0.913	0.909	0.932	0.938	0.932	0.917	0.939	0.872	0.848
			(.065)	(.068)	(.075)	(.072)	(.074)	(.065)	(.072)	(.063)	(.065)
		3	0.773	0.763	0.769	0.834	0.769	0.821	0.834	0.752	0.645
			(.064)	(.064)	(.065)	(.075)	(.064)	(.070)	(.075)	(.064)	(.041)
		5	0.887	0.876	0.871	0.939	0.869	0.937	0.932	0.866	0.872
			(.062)	(.059)	(.059)	(.071)	(.058)	(.071)	(.073)	(.060)	(.060)
		7	0.855	0.838	0.843	0.85	0.844	0.843	0.849	0.826	0.762
			(.060)	(.060)	(.059)	(.058)	(.058)	(.059)	(.057)	(.065)	(.058)
		8	0.827	0.802	0.802	0.808	0.802	0.808	0.808	0.804	0.773
			(.063)	(.063)	(.063)	(.065)	(.063)	(.065)	(.065)	(.063)	(.053)

Table S21. Results for quantitative variables (Variables 15, 16, and 17) in the Hepatitis data. The number of datasets, over the 100 datasets, where the method achieves the best $RMSE_p$ is recorded for each method. The method with the highest number under a condition is marked with a rectangle. Imputation methods: M_1: *rpart* with surrogate variables; M_2: GI (RSS) + majority rule; M_3: GI (RSS) + RE algorithm; M_4: GI (RSS) + H-RE algorithm; M_5: CHI + majority rule; M_6: CHI + RE algorithm; M_7: CHI + H-RE algorithm; M_8: iterative imputation.

		Imputation Methods							
Variables	Types	M_1	M_2	M_3	M_4	M_5	M_6	M_7	M_8
15	MAR	18	11	7	8	23	15	9	17
	MNAR	1	3	11	20	4	15	23	27
16	MAR	22	9	8	8	15	17	17	14
	MNAR	32	6	6	5	19	13	12	9
17	MAR	12	6	14	10	12	25	17	12
	MNAR	11	5	3	5	30	20	23	7

Table S22. Results for categorical variables (Variables 4, 6, 7, 10, and 12) in the Hepatitis data. The number of datasets, over the 100 datasets, where the method achieves the best PCC_p is recorded for each method. The method with the highest number under a condition is marked with a rectangle. Imputation methods: M_1: *rpart* with surrogate variables; M_2: GI (RSS) + majority rule; M_3: GI (RSS) + RE algorithm; M_4: GI (RSS) + H-RE algorithm; M_5: CHI + majority rule; M_6: CHI + RE algorithm; M_7: CHI + H-RE algorithm; M_8: iterative imputation.

		Imputation Methods							
Variables	Types	M_1	M_2	M_3	M_4	M_5	M_6	M_7	M_8
4	MAR	22	12	14	14	27	24	26	14
	MNAR	14	12	22	23	19	24	20	7
6	MAR	29	16	13	18	32	20	33	35
	MNAR	20	22	22	25	21	34	35	26
7	MAR	32	22	23	25	26	24	25	36
	MNAR	25	20	38	43	10	16	13	17
10	MAR	39	32	30	24	32	25	18	29
	MNAR	43	10	9	16	24	19	21	11
12	MAR	22	18	18	19	22	28	25	31
	MNAR	31	14	23	29	20	16	10	20

Table S23. Results for quantitative variables (Variables 2, 3, and 11) in the Credit approval data. The number of datasets, over the 100 datasets, where the method achieves the best $RMSE_p$ is recorded for each method. The method with the highest number under a condition is marked with a rectangle. Imputation methods: M_1: *rpart* with surrogate variables; M_2: GI (RSS) + majority rule; M_3: GI (RSS) + RE algorithm; M_4: GI (RSS) + H-RE algorithm; M_5: CHI + majority rule; M_6: CHI + RE algorithm; M_7: CHI + H-RE algorithm; M_8: iterative imputation.

		Imputation Methods							
Variables	Types	M_1	M_2	M_3	M_4	M_5	M_6	M_7	M_8
2	MAR	37	4	12	11	11	12	13	6
	MNAR	19	12	19	25	4	6	9	18
3	MAR	18	14	8	4	23	13	6	18
	MNAR	17	19	6	9	13	9	9	19
11	MAR	38	25	22	20	18	14	14	10
	MNAR	38	31	21	19	1	0	0	30

Table S24. Results for categorical variables (Variables 4, 9, 10, 12, and 13) in the Credit approval data. The number of datasets, over the 100 datasets, where the method achieves the best PCC_p is recorded for each method. The method with the highest number under a condition is marked with a rectangle. Imputation methods: M_1: *rpart* with surrogate variables; M_2: GI (RSS) + majority rule; M_3: GI (RSS) + RE algorithm; M_4: GI (RSS) + H-RE algorithm; M_5: CHI + majority rule; M_6: CHI + RE algorithm; M_7: CHI + H-RE algorithm; M_8: iterative imputation.

		Imputation Methods							
Variables	Types	M_1	M_2	M_3	M_4	M_5	M_6	M_7	M_8
4	MAR	100	100	100	100	76	76	76	100
	MNAR	100	100	100	100	78	78	78	100
9	MAR	35	49	48	49	4	4	4	66
	MNAR	27	46	48	48	25	25	25	59
10	MAR	100	100	100	100	100	100	100	100
	MNAR	100	100	100	100	100	100	100	100
12	MAR	30	23	23	18	18	23	18	26
	MNAR	16	28	26	26	23	22	23	27
13	MAR	59	55	51	53	51	63	63	51
	MNAR	57	53	54	55	41	54	54	51